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(54) **Blast compositions in shaft furnaces**

(57) A gaseous fluid having a lower oxygen content than air e.g. nitrogen or combustion vapour, is added to the air constituting the hot blast to a shaft furnace, e.g. an iron blast furnace without hydrocarbon injections, so that a high blast temperature can be maintained.

GB 2 057 508 A

SPECIFICATION

Method of operating a shaft furnace

The present invention relates to the operation of shaft furnaces, particularly, but not exclusively, blast furnaces for producing pig iron.

For some years blast furnaces have been charged with increasingly greater amounts of hydrocarbons such as fuel oil or natural gas, in order to reduce coke consumption. Such injections have a cooling effect and high air-blast temperatures have to be used in order to main a sufficient flame temperature.

Nowadays, however, hydrocarbons are increasingly costly and there is a possibility that there will be difficulties in obtaining supplies. Any reduction in the amounts of hydrocarbons injected into a blast furnace in which the air-blast is maintained at a high temperature, would however lead to excessive flame temperatures and to a considerable heat deficit in the furnace throat.

Strictly from a thermal point of view, it would be possible to replace these injections of hydrocarbons by other cooling injections, for example water vapour, in order to maintain high air-blast temperatures. The latter, however, is very costly and its production requires the consumption of considerable amounts of energy. In addition, such an injection leads to an increase in the coke rate by 25 to 30 kg per tonne of pig iron. The industry therefore requires a method of operating blast furnaces which, whilst maintaining the high air-blast temperatures used at present, enables the overall energy consumption to be minimised.

During research aimed at developing a method which fulfils this objective, we have now discovered that it is possible to maintain high air-blast temperatures, even when there are not hydrocarbon injections, by reducing the oxygen content of the air-blast.

Thus, according to the present invention, the oxygen content of the air blown into the blast furnace is reduced by adding a gaseous fluid to the air-blast, which fluid has a lower oxygen content than the air-blast.

Preferably, the gaseous fluid is introduced, without pressure, into the air taken in by the blowing apparatus.

A particularly advantageous embodiment consists in introducing combustion vapour which is rich in nitrogen into the air-blast, this vapour being supplied for example from Cowper stoves.

A further advantageous embodiment consists in introducing nitrogen supplied for example from an oxygen production plant, into the air-blast.

By way of example, the following table shows the results obtained respectively with a fuel oil injection, without any injection, with the addition of nitrogen to the hot air-blast, and with the addition of vapour from Cowper stoves to the air-blast.

The temperature in the furnace throat was maintained constant at 120°C.

			Fuel oil injection	air alone	N_2 injection	Vapour injection
Coke rate		kg/t	404	507	464	488
Air-blast temperature		°C	1250	934	1250	1250
Injections						
– fuel oil	amount	kg/t	60	–	–	–
– N_2	amount	m^3N/t	–	–	1250	–
	temp.	°C	–	–	1250	–

CLAIMS

1. A method of operating a shaft furnace in which air at elevated temperature is blown into the furnace without hydrocarbon injections, and the oxygen content of the air is reduced by adding to it a gaseous fluid having an oxygen content which is lower than that of the air.

2. A method as claimed in claim 1, in which the gaseous fluid comprises nitrogen.

3. A method as claimed in claim 1, in which the gaseous fluid comprises combustion vapour.

4. A method as claimed in any of claims 1 to 3, in which the gaseous fluid is added to the air taken in by a blowing apparatus.

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